Cropping Intensity

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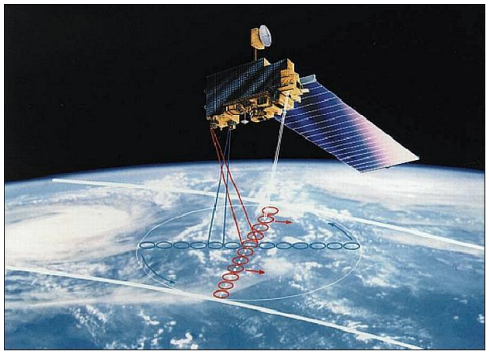
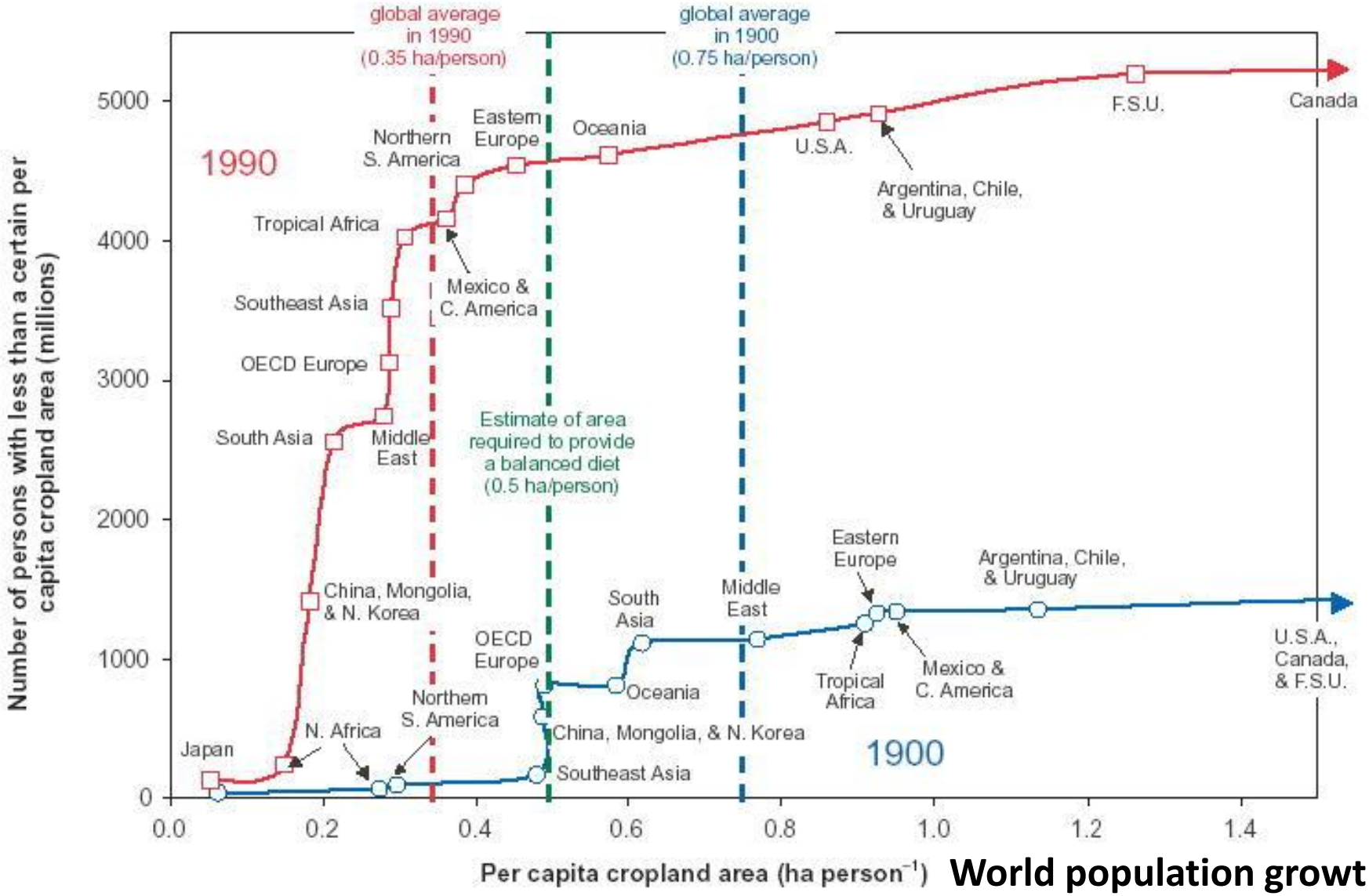




Per capita cropland area

From Ramankutty et al. 2002, Ambio, 31(3)

World population growth

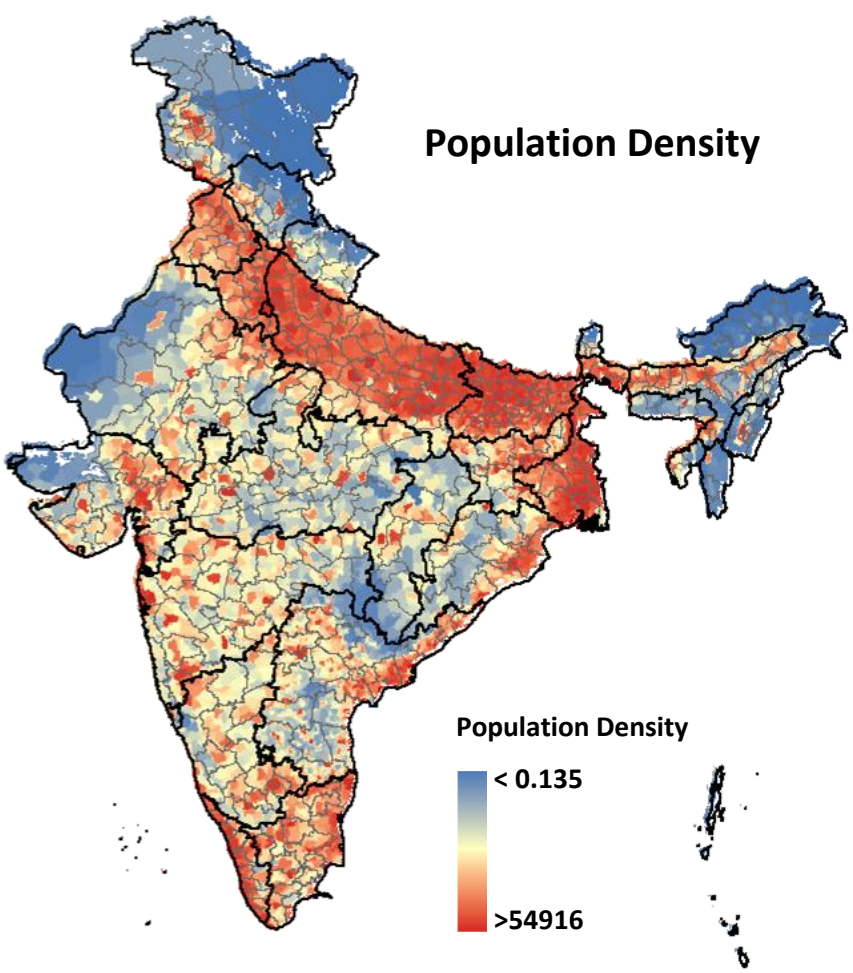
1.6 billion in 1900

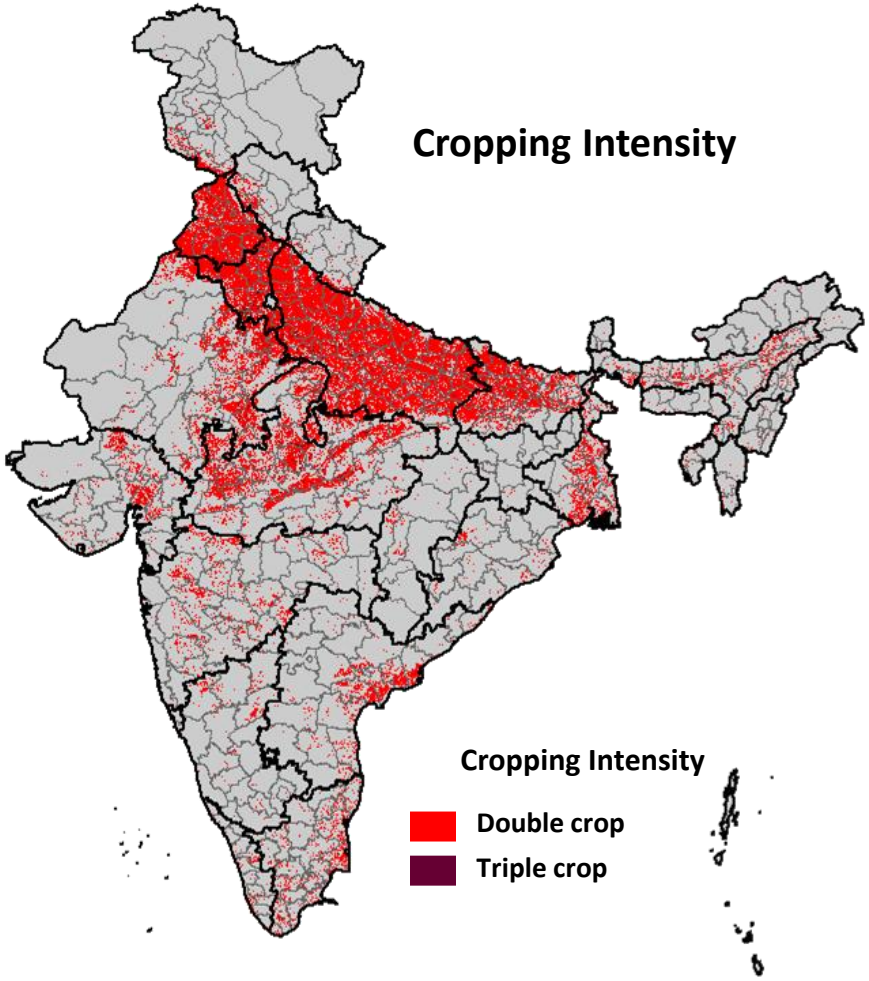
5.3 billion in 1990

7.0 billion in 2011

9.3 billion in 2050*

Agricultural intensification to meet the need of rising population





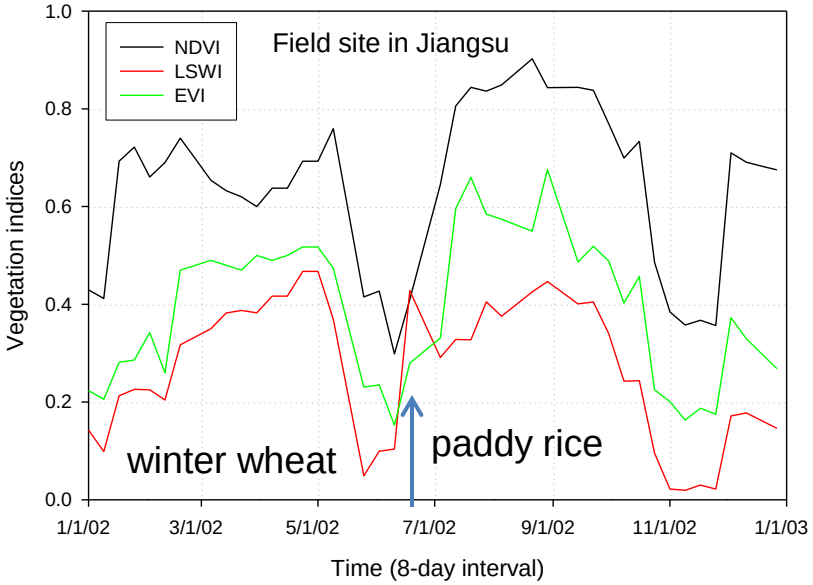
Algorithm development for cropping intensity

1-crop per year

2-crop per year

3-crop per year

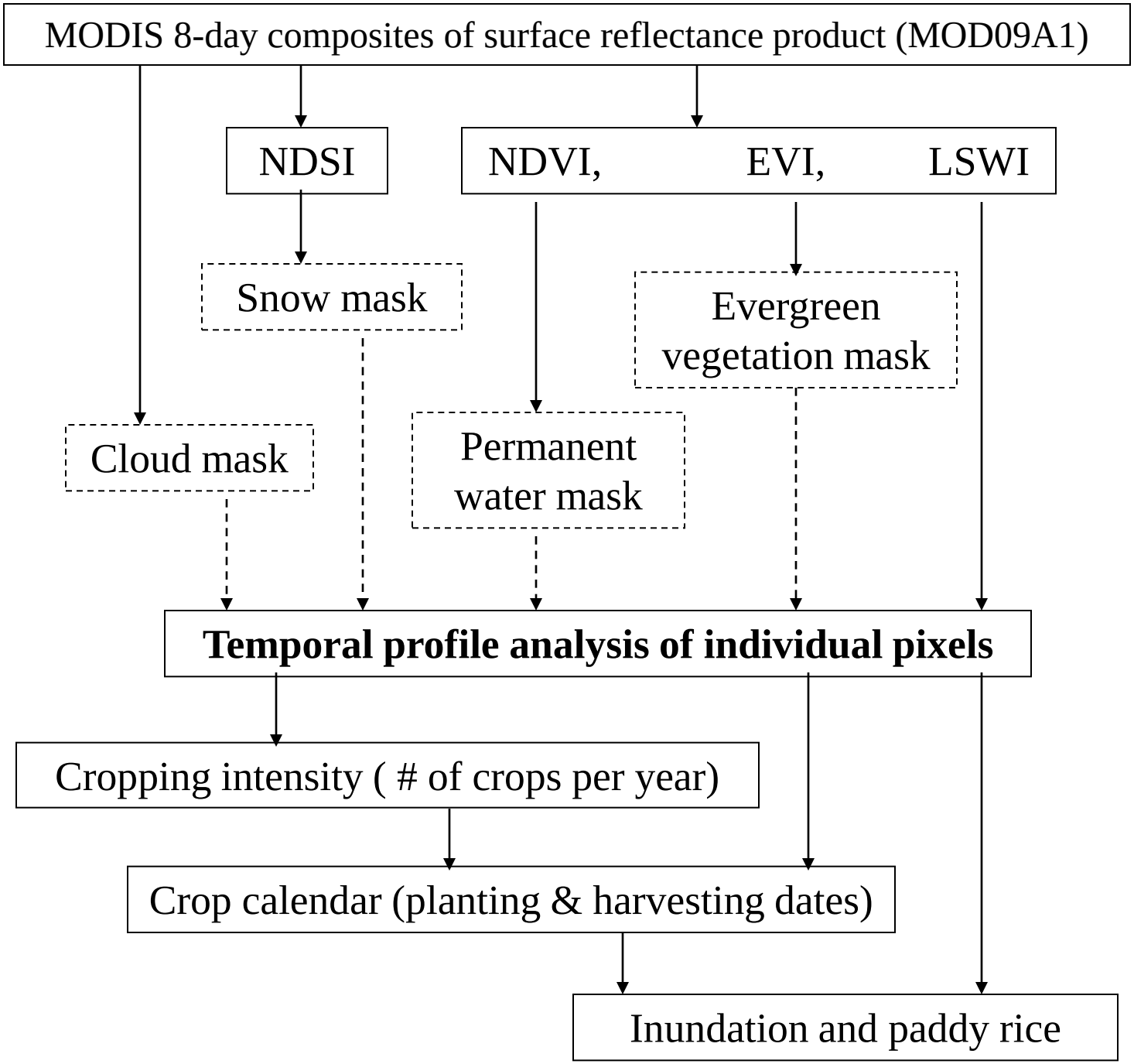
Dynamics of winter wheat and paddy rice fields in Nanjing, Jiangsu, China



(c) 7/3/99 2-weeks after rice transplanting

(b) 6/11/99 rice field preparation

(d) 9/6/99 rice plant heading


MODIS 8-day composites of surface reflectance product (MOD09A1)
NDSI
NDVI, EVI, LSWI
Snow mask
Evergreen vegetation mask
Cloud mask
Permanent water mask
Temporal profile analysis of individual pixels
Cropping intensity (# of crops per year)
Crop calendar (planting & harvesting dates)
Inundation and paddy rice

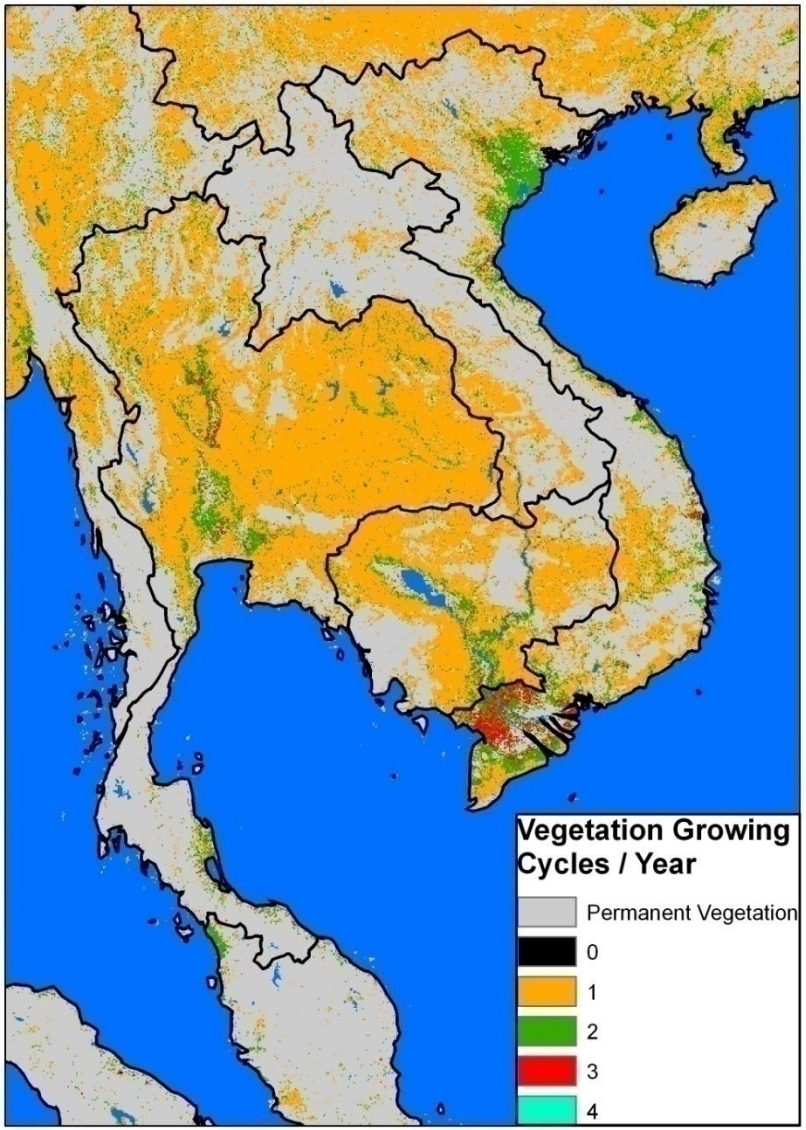
Implementation of the algorithm for cropping intensity -- Asia

1-crop per year

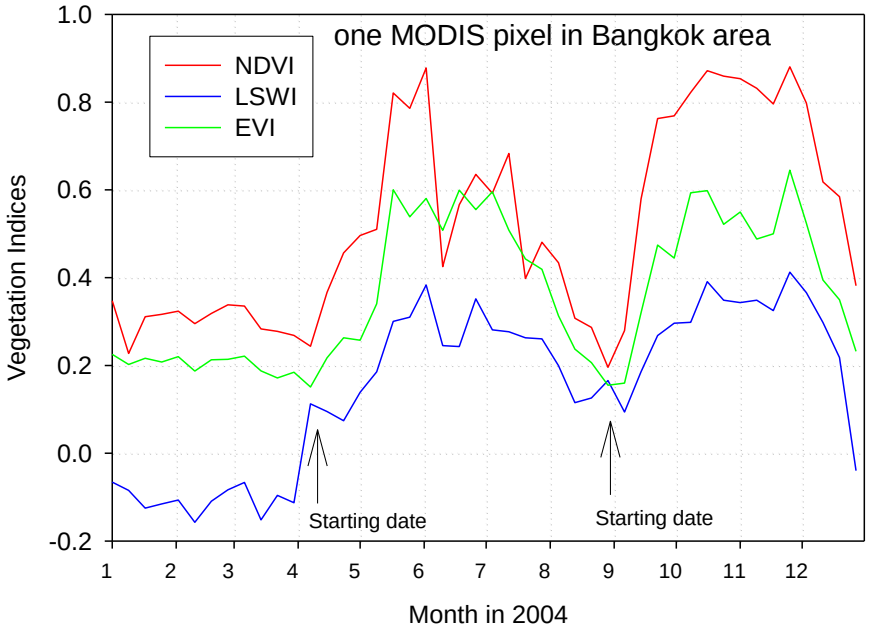
2-crops per year

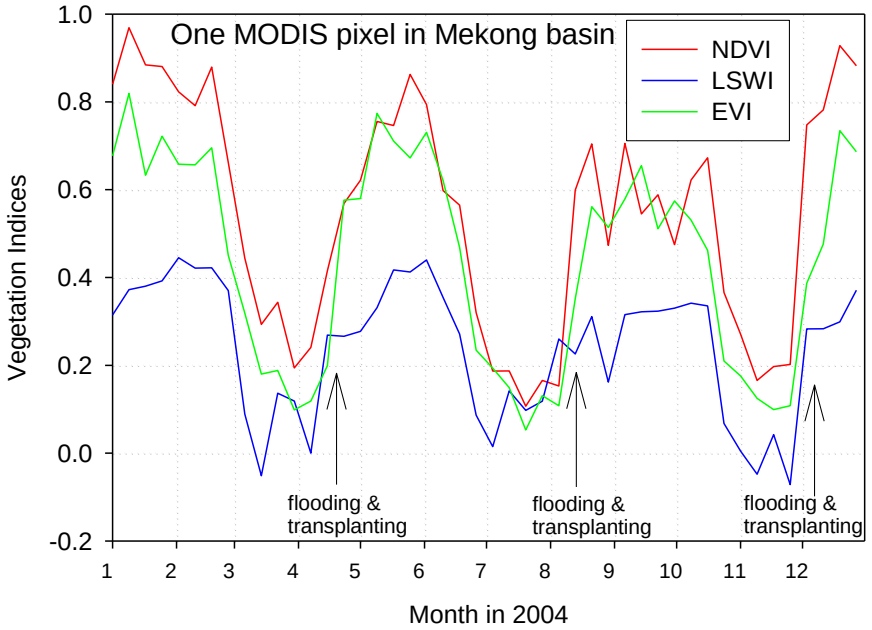
3-crops per year

Global Mapping of Croplands



Cropping Intensity map in 2004





Implementation of the algorithm for cropping intensity

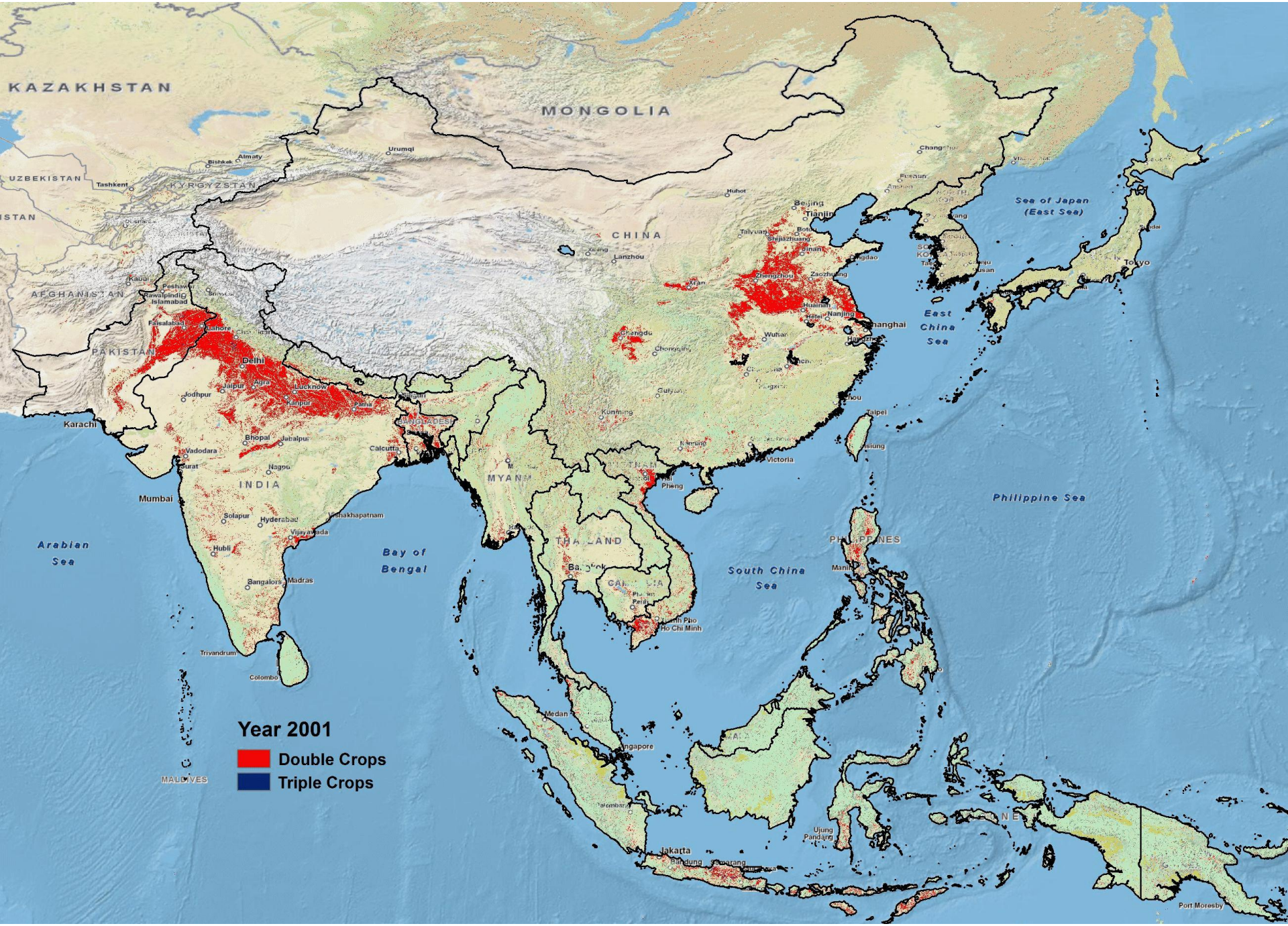
-- Asia

-- multiple years, e.g., 2001 – 2010

1-crop per year

2-crop per year

3-crop per year


KAZAKHSTAN
MONGOLIA
UZBEKISTAN
KYRGYZSTAN
CHINA
AFGHANISTAN
PAKISTAN
INDIA
Sea of Japan
(East Sea)
East
China
Sea
South China
Sea
Philippine Sea
Arabian
Sea
Bay of
Bengal
Almaty
Bishkek
Urumqi
Tashkent
Kabul
Peshawar
Rawalpindi
Islamabad
Faisalabad
Lahore
Delhi
Jaipur
Agra
Lucknow
Jodhpur
Kanpur
Patna
Karachi
Bhopal
Jabalpur
Calcutta
Vadodara
Surat
Nagpur
Mumbai
Solapur
Hyderabad
Vishakhapatnam
Vijayawada
Hubli
Bangalore
Madras
Trivandrum
Colombo
MALDIVES
Lanzhou
Xian
Zhengzhou
Beijing
Tianjin
Shijiazhuang
Qingdao
Zaozhuang
Huainan
Nanjing
Shanghai
Wuhan
Changdu
Kunming
Tokyo
Taipei
Victoria
Ho Chi Minh
Medan
Singapore
Jakarta
Bandung
Semarang
Ujung
Pandang
Port Moresby
Year 2001
Double Crops
Triple Crops

Implementation of the algorithm for cropping intensity

-- The globe

1-crop per year

2-crop per year

3-crop per year

Global Multiple-Cropping Croplands in 2010

1st version (as of October 4, 2011).

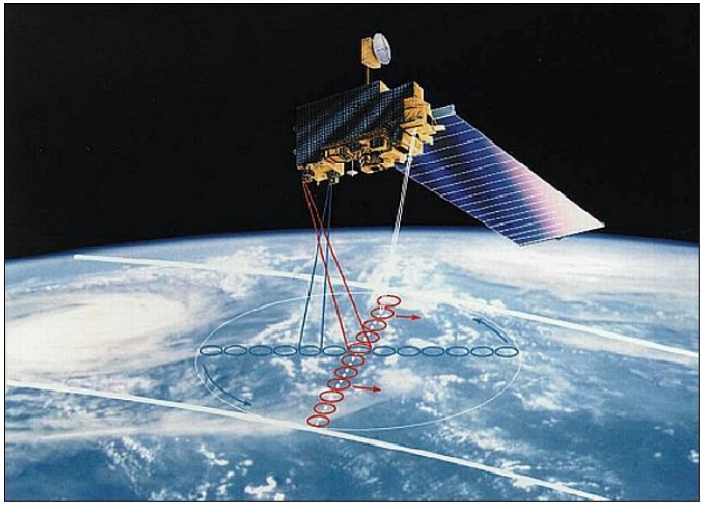
Many problems – calendar year (North Hemisphere versus South Hemisphere), monsoon, Savanna vegetation, summer drought-affected grassland vegetation

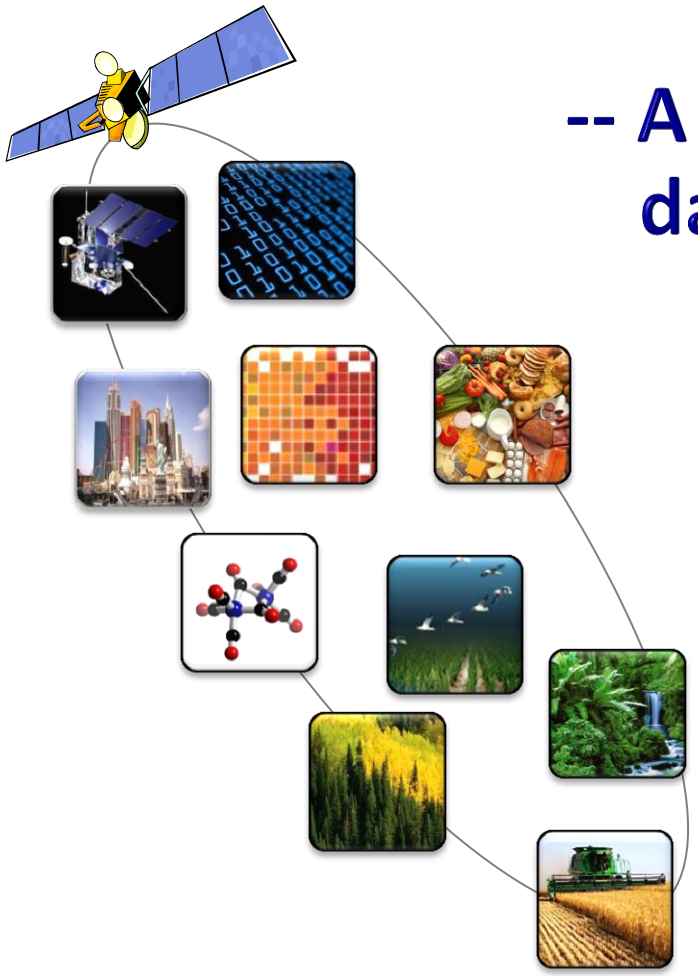
Challenging issues in agriculture mapping and monitoring

Calibration and validation of cropland mapping

Rapid and dynamic mapping of croplands

-- Community remote sensing approach





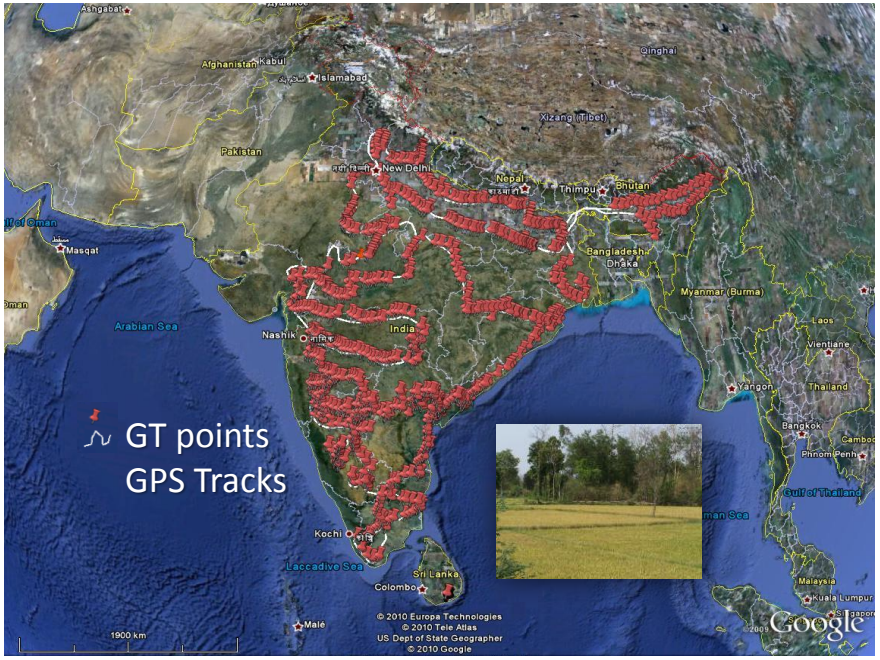
The Field-Photo Library
-- A community- and citizen- science data portal to share and archive geo-referenced field photos

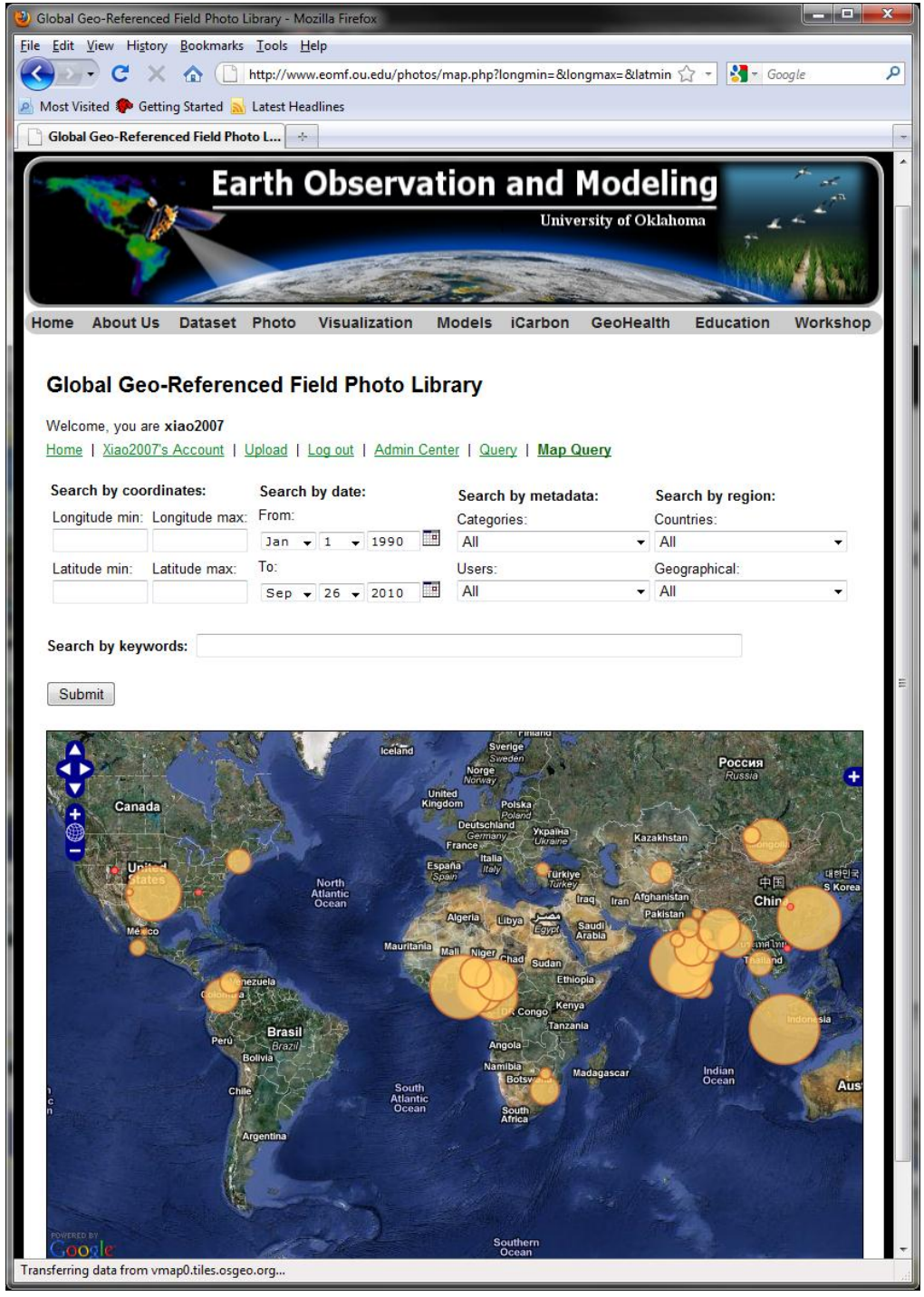
www.eomf.ou.edu/photos

The Field-Photo Library at the University of Oklahoma (http://www.eomf.ou.edu/photos)

It archives and shares geo-tagged field photos for wildlife, habitats, land use and land cover changes in the world.

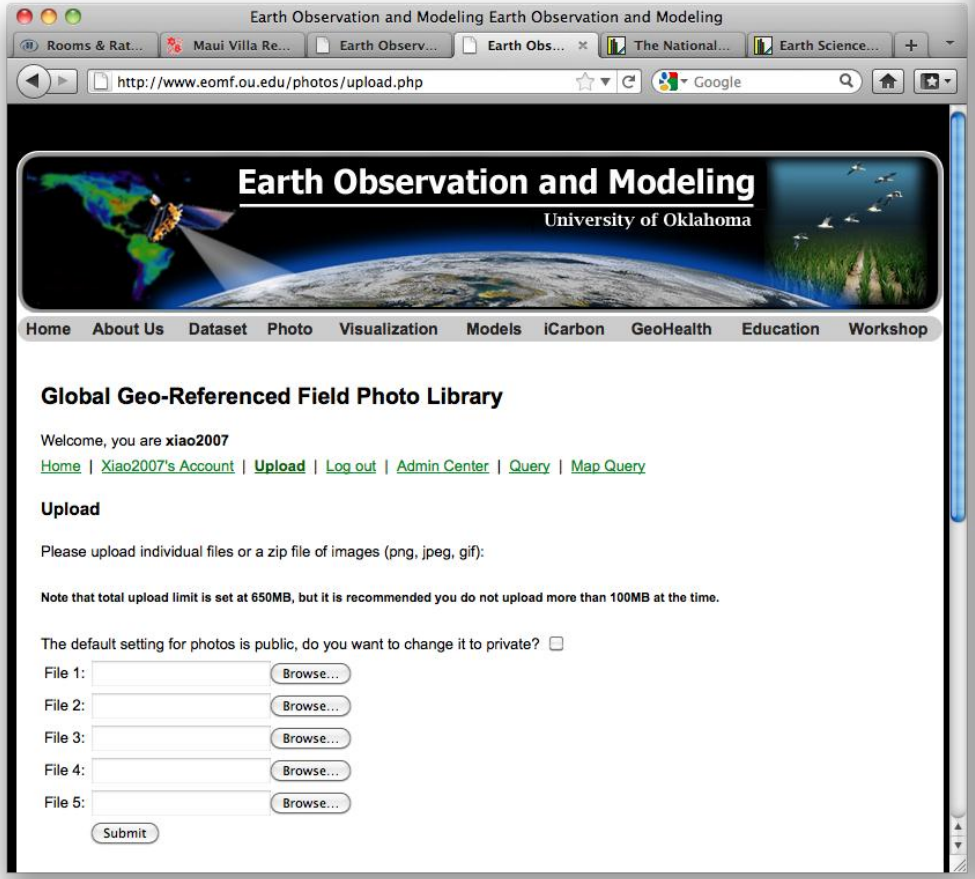
GPS-based camera and cellphone

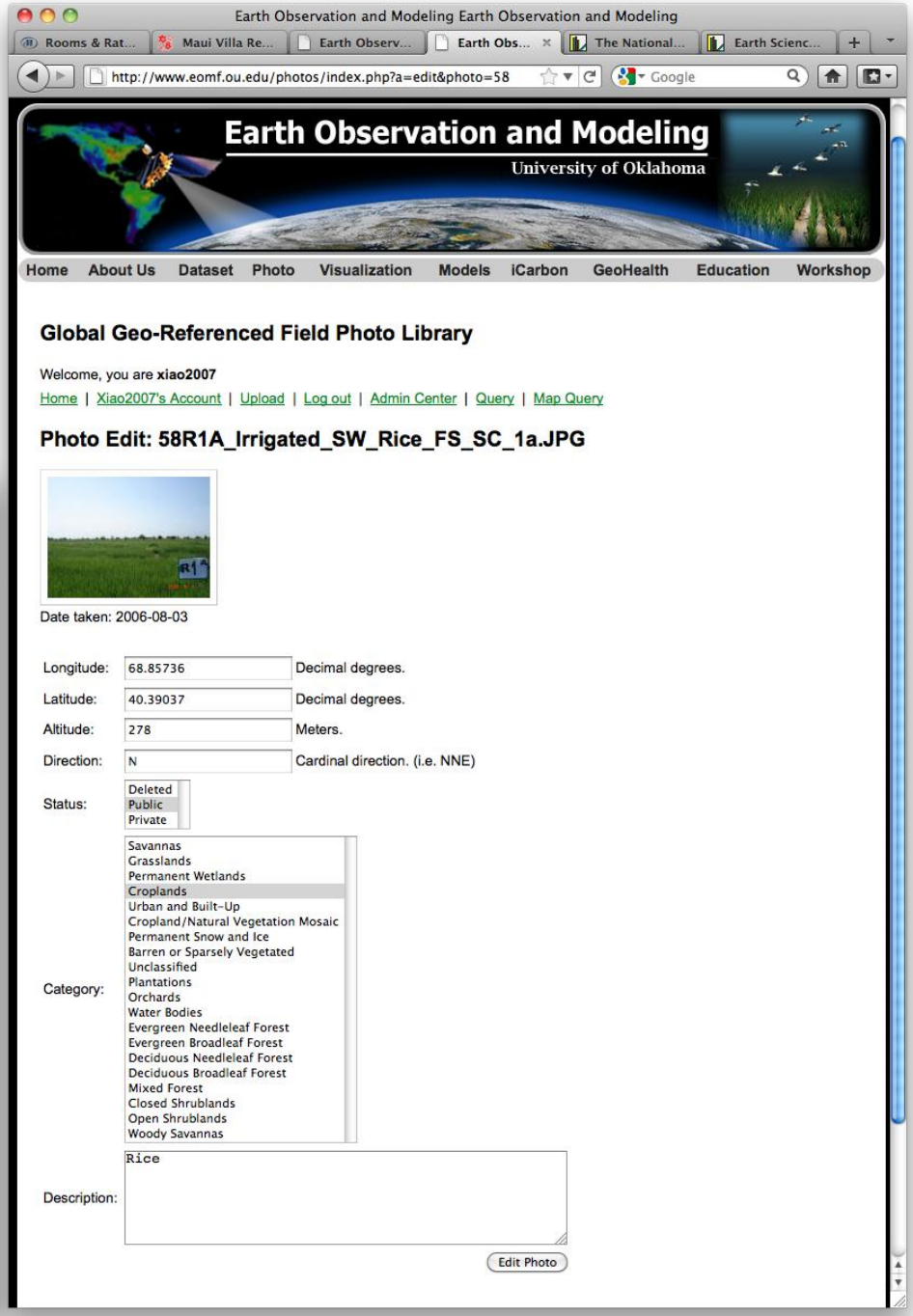




The Field-Photo Library at the University of Oklahoma (http://www.eomf.ou.edu/photos)

Users can upload geo-tagged field photos, and classify photos by predefined land cover types (IGBP), and write additional information for photos. User can also download photos and thematic databases (e.g., land cover types).





Link geo-tagged photos with MODIS time series data for land use dynamics

Earth Observation and Modeling Earth Observation and Modeling

http://www.eomf.ou.edu/photos/query.php?longmin=&longmax=

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Global Geo-Referenced Field Photo Library

Welcome, you are **Guest**

Home | Log in | Register | **Query** | Map Query

Search by coordinates: Longitude min: Longitude max: Latitude min: Latitude max:

Search by date: From: Jan 1 1990 To: Jun 5 2011

Search by metadata: Categories: All Users: All

Search by region: Countries: All Geographical: All

Search by keywords: rice

Submit

Photos found: 1611 « Previous 1 2 3 4 5 6 7 ... 68 Next » All Page: 1 Items per page: 24

Check All | Uncheck All

Date taken: 2006-07-07
68.857 °E, 40.3854 °N
Category: Croplands
MODIS time series data: View

Date taken: 2005-05-07
68.8595 °E, 40.3838 °N
Category: Croplands
MODIS time series data: View

Date taken: 2006-08-03
68.8574 °E, 40.3904 °N
Category: Croplands
MODIS time series data: View

Date taken: 2006-08-03
68.8563 °E, 40.3896 °N
Category: Croplands
MODIS time series data: View

Date taken: 2006-08-03
68.8574 °E, 40.3905 °N
Category: Croplands
MODIS time series data: View

Date taken: 2006-08-03
68.8565 °E, 40.3906 °N
Category: Croplands
MODIS time series data: View

Date taken: 2006-08-03
68.8565 °E, 40.3905 °N
Category: Croplands
MODIS time series data: View

Date taken: 2007-05-25
116.7586 °E, 28.9063 °N
Category: Croplands
MODIS time series data: View

Earth Observation and Modeling Data Visualization

http://www.eomf.ou.edu/visualization/graph-mod09a1-2007-28.7

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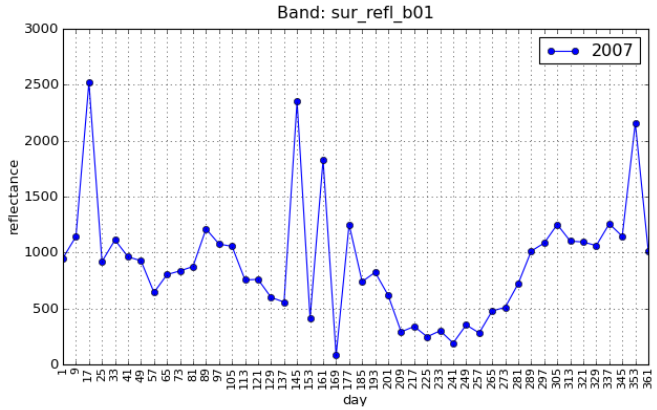
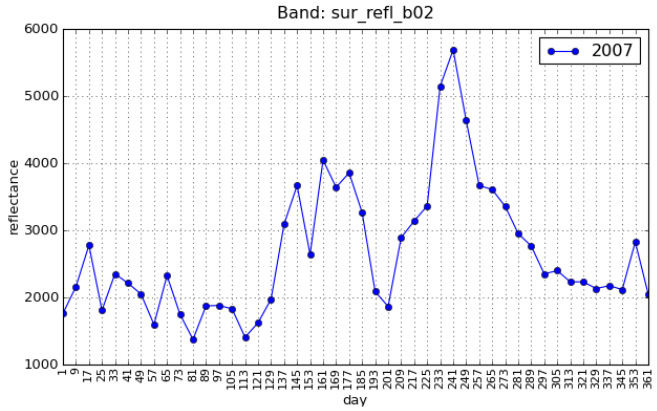
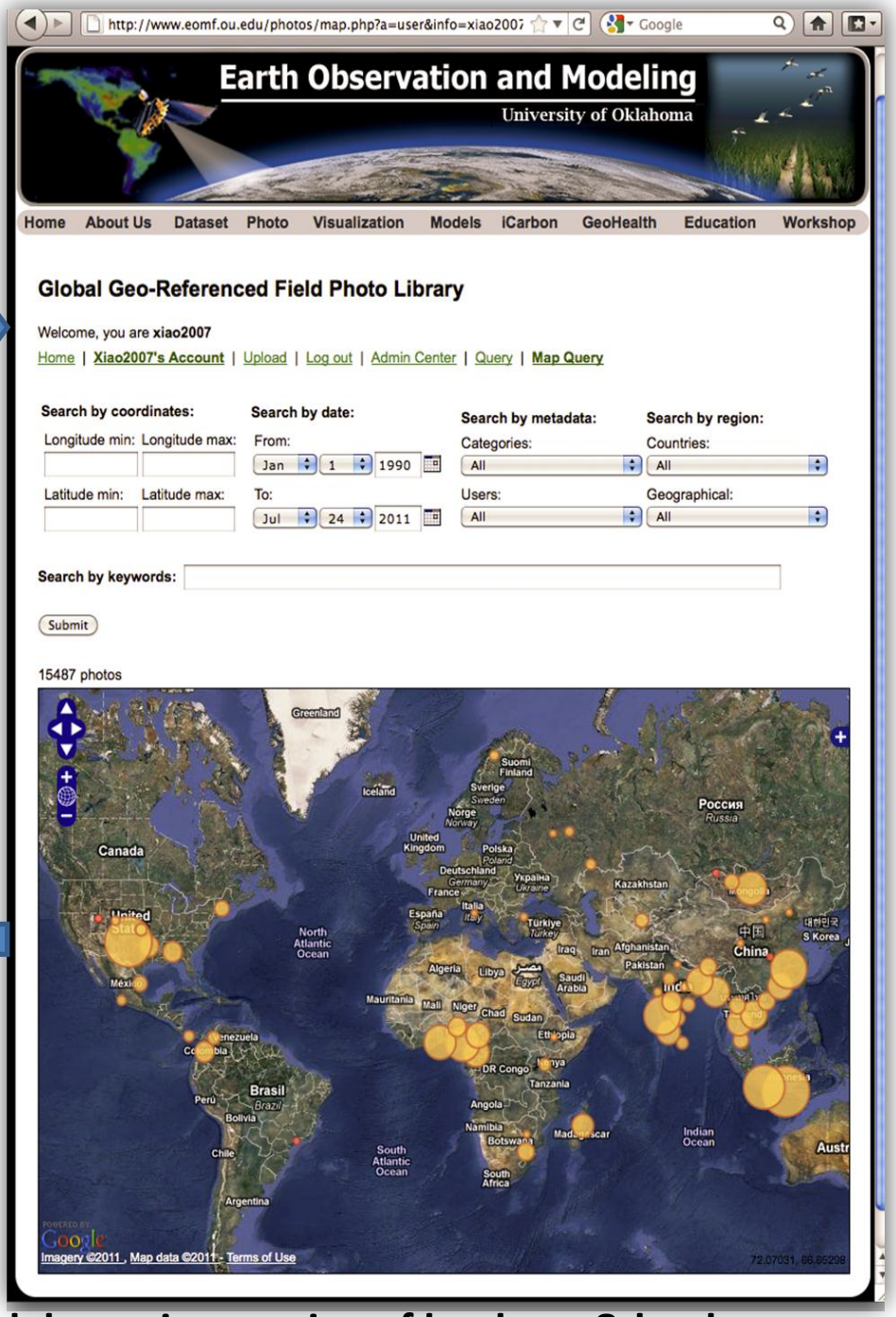
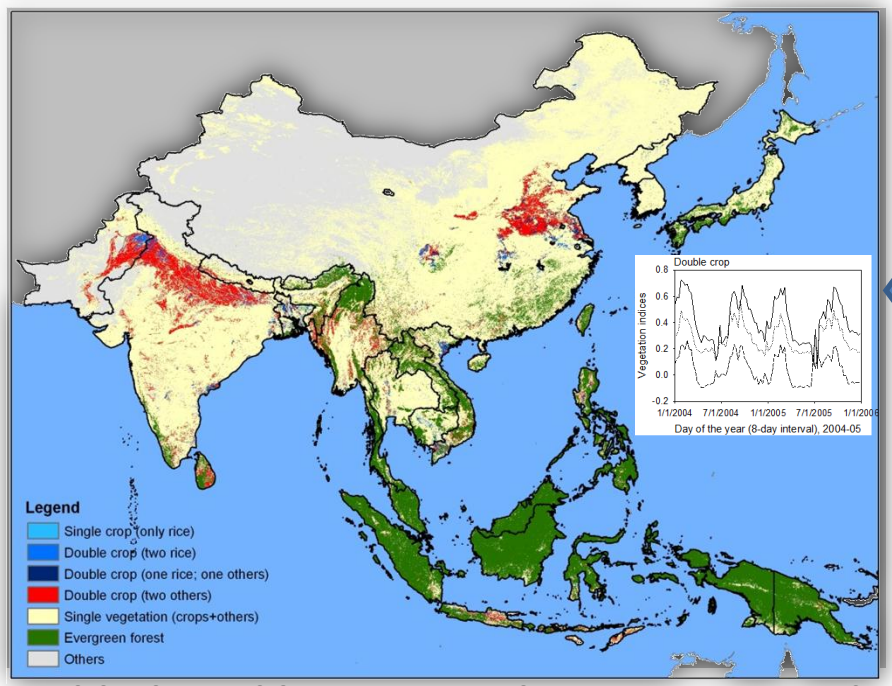
Latitude: 28.791766666667
Longitude: 116.08361666667
Modis: mod09a1
Tile: h28v06
Year: 2007
Cell (row, column): 289, 414
The scaling factor of the seven spectral bands: 10,000









Field-Photo library is used to support rapid and dynamic mapping of land use & land cover

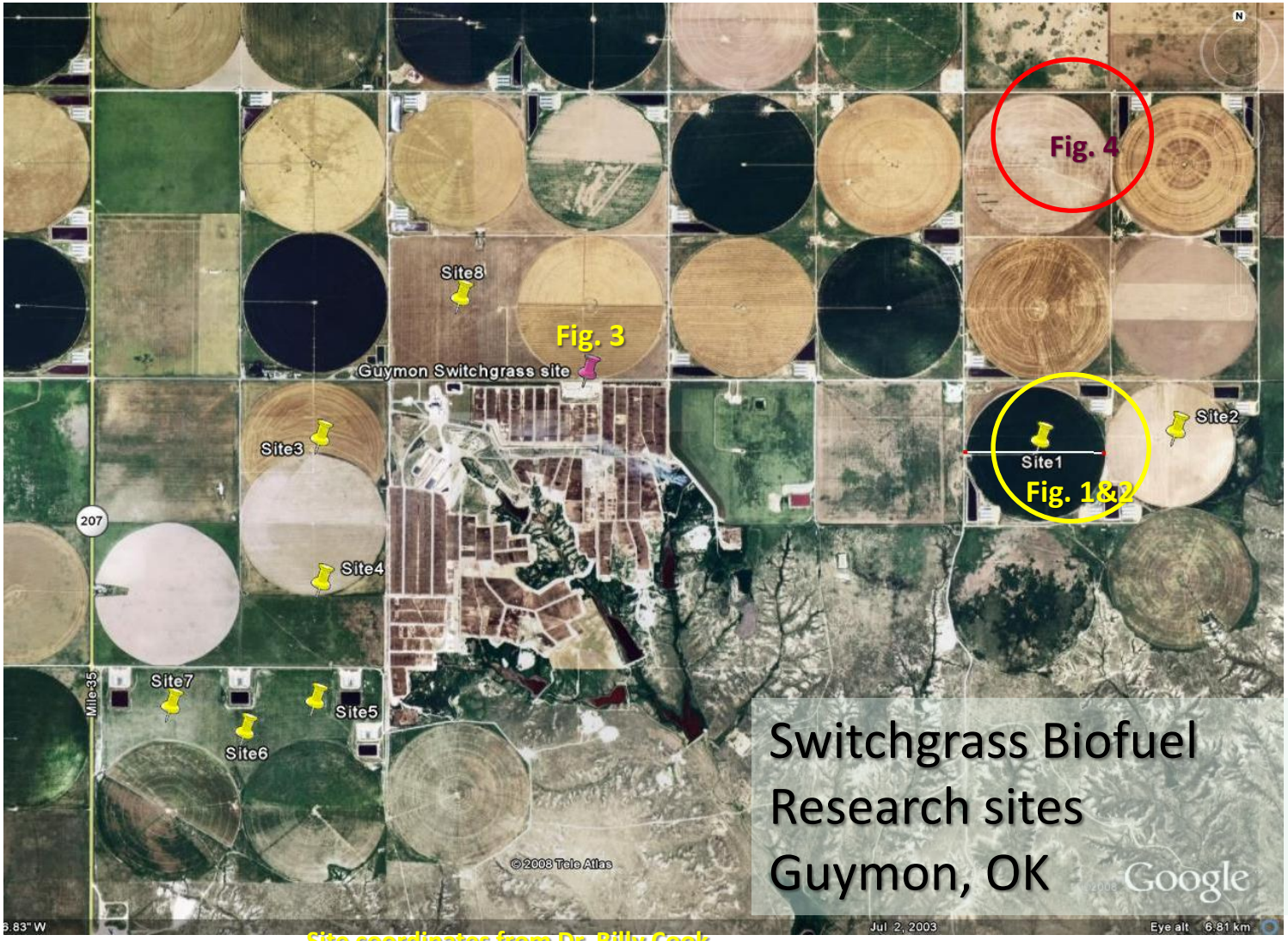
Challenging issues in agriculture mapping and monitoring

Biofuel feedstock production and cropland intensification

Challenging issues in agriculture mapping and monitoring

Earth Observation and Modeling
University of Oklahoma

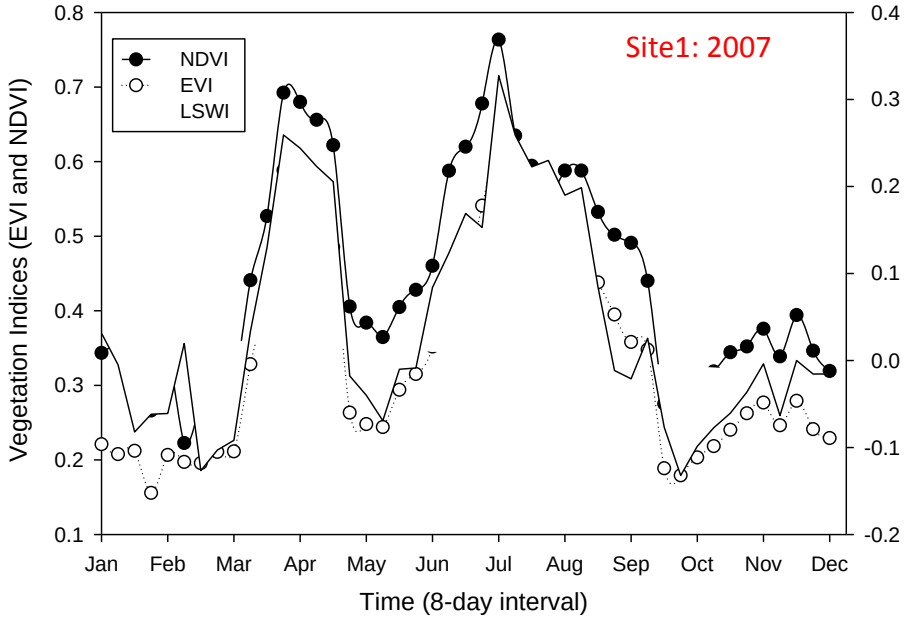
Dynamics of cropland and biofuel feedstock cultivation

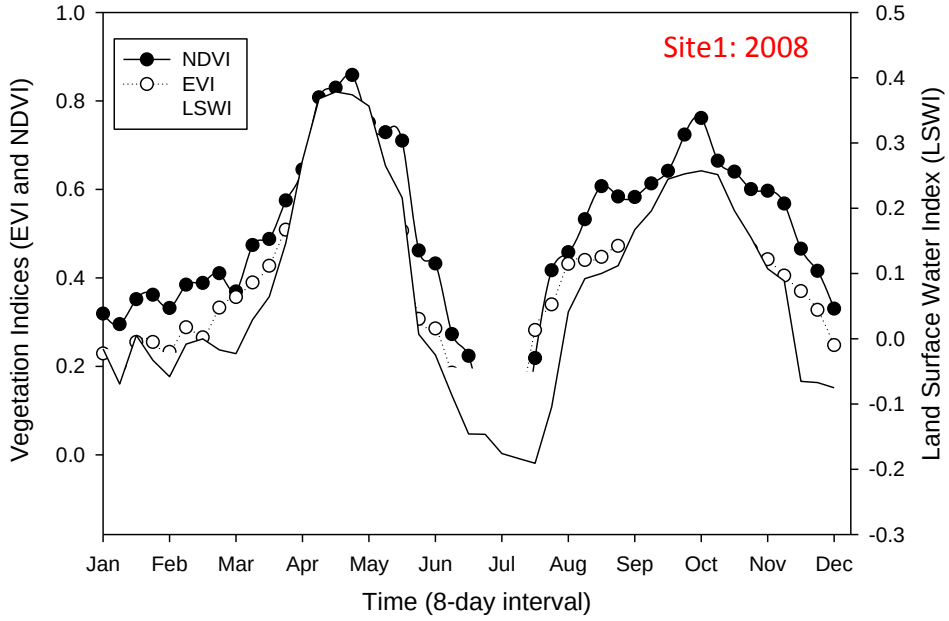


Site coordinates from Dr. Billy Cook

Case study

Will biofuel feedstock production change land surface phenology and cultivation intensity in Southern Great Plains, USA?





Vegetation indices (NDVI, EVI and LSWI) from 8-day MODIS images (MOD09A1) at the experimental site #1 , switchgrass biofuel research sites, Guymon, Oklahoma.

Challenging issues in agriculture mapping and monitoring

Cropland gross and net primary production,

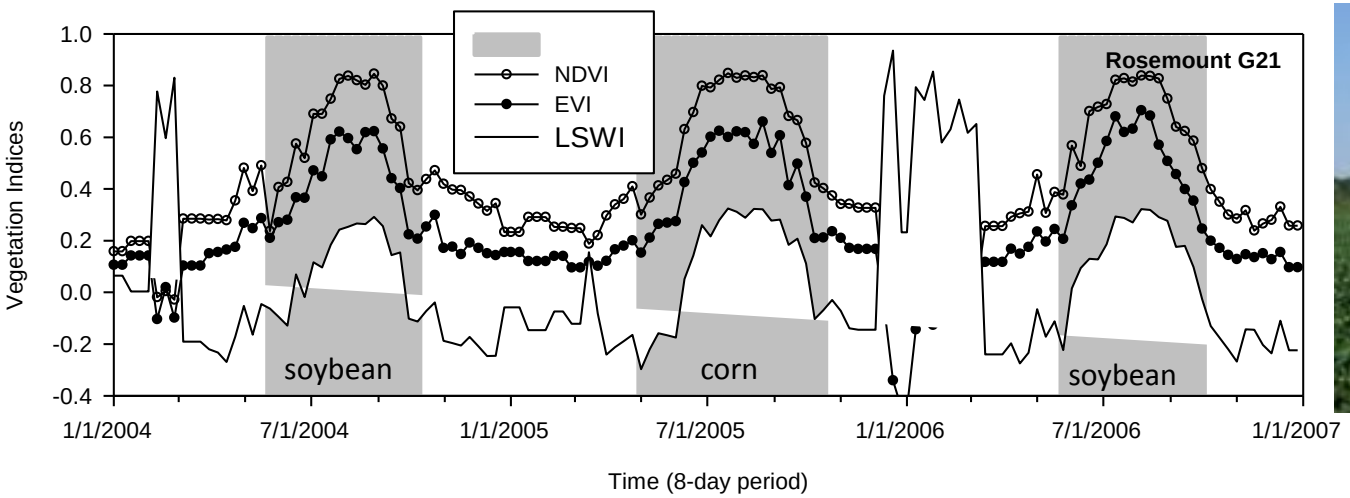
biogeochemical cycle

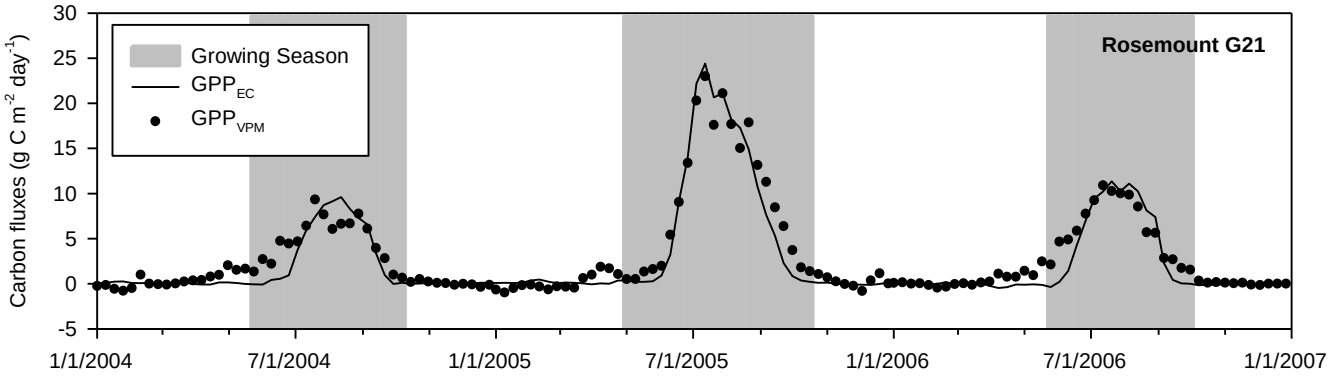
water use (irrigation, ET)

Disease ecology

Quantify gross primary production of maize and soybean in USA

A rotation of maize field and soybean field over two years is common agricultural practice in USA. The VPM model was applied to estimate GPP of maize and soybean. Figures below show a case study in the Rosemount G21 site, Minnesota (Soybean in 2004, maize in 2005, and soybean in 2006).





http://www.biometeorology.umn.edu/research_fac.php